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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Applicant: Ilya V. Karpov	§	Art Unit:	2815
Serial No.: 10/634,141	§	Examiner:	Eugene Lee
Filed: August 4, 2003	§	Atty Docket:	ITO.0554US (P16589)
For: Reducing Parasitic Conductive Paths in Phase Change Memories	§	Assignee:	Ovonyx, Inc.

Mail Stop **Appeal Brief-Patents**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REPLY BRIEF

In response to the new arguments raised by the Examiner, the following reply brief is submitted.

In the Answer, the Examiner says that the term "sublithographic" is never defined, much less used, in the applicant's disclosure. Of course, the law is clear that the same words need not be used in the specification and the claims. Thus, the observation misses the critical point, which is whether one skilled in the art would readily understand what sublithographic means based on the disclosure. This issue, the Answer does not really address.

Conventionally, one could use lithography to etch. In lithography, a pattern is optically transferred from a source to a mask on the substrate. The accuracy of the optical technical, called photolithography, is limited. In other words, with conventional photolithographic techniques, only so small an opening can be made because of the resolution possible with these techniques.

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Cynthia L. Hayden

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In contrast, if one were to make an opening using photolithographic techniques, then form a sidewall spacer in the opening, one could then define the size of the resultant opening by the thickness of the sidewall spacer. If one makes the opening, in which a sidewall spacer is formed, photolithographically, the dimension that can be achieved with the sidewall spacer for the opening is smaller than the lithographic opening.

Necessarily, the sidewall spacer filled lithographic opening is sublithographic because it is based on a lithographic opening which is then reduced through the imposition of a sidewall spacer. The sidewall spacer can be formed by simply blanket depositing a layer over the opening already formed, followed by anisotropic etching to leave a coating on the walls of the original opening. Certainly, one skilled in the art would understand that the resulting dimension is sublithographic.

As explained in connection with Figure 2, a sidewall spacer 24 may be provided within the pore 18. That spacer may be formed of insulating material that is anisotropically etched. See the specification at page 8, lines 1-6. The pore 18 is described in connection with Figure 3 as being formed using conventional etching techniques. See page 8, lines 15-18.

Thus, the question is why would one skilled in the art have any uncertainty about what is meant by sublithographic? One skilled in the art would know that the pore 18 was formed by lithography, at least in one embodiment, and, as a result of coating the walls of that pore with a sidewall spacer, the dimensions of the resulting pore would be a function of how thick of a layer was blanket deposited over the pore 18. Then, the resulting structure would be smaller than the dimensions possible with lithography, i.e., it would be sublithographic.

Therefore, the rejection should be reversed.

While one skilled in the art would readily understand that applying a sidewall spacer would reduce the dimensions of the pore 18 to a sublithographic dimension, he or she would have no clue that advantages could be achieved in connection with a dip back process as described in the illustrated embodiment of the specification. Namely, by reducing the width of the final pore, the amount of the heater material in the pore is reduced. Therefore, it is easier to dip out the top portion of that heater material as set forth in the claims of the present application.

The Answer suggests, at the top of page 7, that the removal of the heater can clearly be done with or without the spacer. Of course, this is true and one skilled in the art would probably never think of using the spacer for this purpose.

The cited reference to Chiang shows the use of a sidewall spacer 24 under a phase change material 18. Certainly, the purpose of the sidewall spacer 24 is to reduce the cross-sectional area of the chalcogenide that is heated. See column 3, lines 37-49. This provides absolutely no reason to use a sidewall spacer for the deposition of a heater.

To the contrary, Chiang expressly suggests not using the sidewall spacer to deposit the heater because, instead, he selectively deposits the heater. As pointed out in Chiang, if the heater is deposited on both the substrate and the spacer 24, "the entire portion of the phase change material along the spacer is heated. In fact, for effective operation of the memory 10a, it is more desirable that only the region at the interface between a lower electrode and the phase change material be heated." See column 3, lines 44-49. Thus, Chiang tells one skilled in the art not to use the spacer to deposit the heater, precisely what is being done here.

Chiang teaches away from the claimed invention and, moreover, provides absolutely no reason to use the spacer to deposit a heater material. Nothing in Chiang, which teaches using a spacer to reduce the cross-section of the phase change material, applies here since what is being done here is using the spacer to reduce the size of the heater to facilitate dipping the heater out.

The Examiner argues that "it does not matter whether Chiang teaches anything about why it would be better to form the sidewall spacer first or second and why one would want to use a sidewall spacer in connection with the formation of a heater of one thickness prior to its subsequent thickness reduction because Chiang already discloses forming a sidewall spacer and a heater as disclosed in applicant's claims without any reference to sequential order." To the contrary, Chiang teaches no such thing. Specifically, Chiang never says to use the sidewall spacer to form the heater. Instead, he is explicit that you use selective deposition to form the heater, not the sidewall spacer.

Claim 1 calls for "forming a heater ... with said sidewall spacer." Chiang does not form the heater with the sidewall spacer, but totally the opposite. In other words, Chiang specifically says do not form the heater with the sidewall spacer, form it by selective deposition instead because, if you form it with the sidewall spacer, you will get bad results, as explained at column 3, lines 44-49.

Similarly, claim 33 calls for filling said sublithographic pore with a heater. Chiang never fills the pore with the heater. Instead, he selectively deposits the heater at the bottom of the pore.

The bottom line is that one skilled in the art would look at all of these references and say nothing ever taught why you would want to use the spacer to form the heater. As pointed out in Chiang, the smaller the pore, the harder it would be to deposit the heater without getting the heater on the spacer. Certainly, in the case of claim 33, filling the pore with the heater is something that Chiang would not recommend.

Therefore, there is no reason why one skilled in the art would arrive at the claimed solution from the cited references and, therefore, the rejection should be reversed.

Respectfully submitted,

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Timothy N. Trop, Reg. No. 28,994
TROP, PRUNER & HU, P.C.
1616 South Voss Road, Suite 750
Houston, TX 77057-2631
713/468-8880 [Phone]
713/468-8883 [Fax]